

What is claimed is:

1. A data compression device comprising:

a plurality of coding means for successively coding a sequence of data signals by using a plurality of coding units that are given identification values, respectively, and that are different in structure from one another to produce a plurality of codes in response to each input data signal;

selecting means for selecting a shortest one of the codes to produce a sequence of the shortest codes and the corresponding identification codes obtained by coding a sequence of the identification values assigned to the coding units of producing the shortest codes; and

re-coding means for re-coding the input data sequence into re-coded codes, by changing the identification values into changed identification values so as to reduce a total code amount of identification codes obtained by the changed identification values and the re-coded codes coded in accordance with the changed identification values and to produce the re-coded codes and the changed identification codes as a compressed output data sequence.

2. A data compression device as claimed in claim 1, wherein the re-coding means changes the sequence of the identification values to the changed identification values, so as to decrease the code amount of the identification codes.

3. A data compression device as claimed in claim 1, wherein the sequence of the identification values is subjected to run length coding to obtain the identification codes.

4. A data compression device as claimed in claim 1, wherein the re-coding means comprises:

calculating means for calculating a first total code amount of the re-coded codes and the corresponding changed identification codes and a second total code amount of the shortest codes and the corresponding identification codes; and

comparing means for comparing the first total code amount with the second total code amount to produce the re-coded codes and the changed identification codes as the compressed output data sequence when the first total code amount is smaller than the second total code amount.

5. A data compression device as claimed in claim 4, wherein the re-coding means comprises:

changing means for further changing the sequence of the identification values so that the changed identification codes have a smaller amount to repeatedly operate the comparing means.

6. A data compression device as claimed in claim 3, wherein run length coding is carried out so that each run of the identification values becomes long and thereby a code amount of the identification values is controlled.

7. A data compression device as claimed in claim 3, wherein the re-coding means comprises:

means for changing the sequence of the identification values divided into a plurality of runs, into the changed identification values by lengthening each run of the identification values; and

a plurality of coding means for coding the input data signals in accordance with the changed identification values.

8. A data compression device as claimed in claim 7, wherein the plurality of the coding means are selected by each of the changed identification values.

9. A data compression device as claimed in claim 1, wherein the plurality of the coding means are Huffman coders that have different coding tables.

10. A data compression device as claimed in claim 9, wherein the re-coding means comprises:

a plurality of additional Huffman coders that have different coding tables and that are made to correspond to the Huffman coders, respectively.

11. A data compression method comprising the steps of:  
coding a sequence of input data signals into a plurality of code sequences obtained by the use of different coding methods given identification values, respectively;

selecting a shortest one of the code sequences together with a selected sequence of the identification values concerned with each code of the shortest code sequence;

coding the selected identification value sequence into a sequence of identification codes;

changing the selected identification value sequence into a changed sequence of identification values; and

re-coding the input data signals by the use of the changed sequence of the identification values to obtain re-coded codes and the corresponding changed identification codes and to produce the re-coded codes and the corresponding changed identification codes as a data compressed output signal sequence.

12. A data compression method as claimed in claim 11, wherein the changing step is executed so that a code amount of identification codes obtained by the changed sequence of the identification values becomes small in comparison with a code amount of the selected identification value sequence.

13. A data compression method as claimed in claim 11, wherein the re-coding step comprises the steps of:

calculating a first total code amount of the re-coded codes and the corresponding changed identification codes and a second total code amount of the shortest codes and the corresponding identification codes; and

comparing the first total code amount with the second total code amount to produce the re-coded codes and the changed identification codes as the compressed output data sequence when the first total code amount is smaller than the second total code amount.

14. A data compression method as claimed in claim 13, wherein the re-coding step comprises the step of:

further changing the sequence of the identification values so that the changed identification codes have a smaller amount to repeatedly operate the comparing step.

15. A data compression method as claimed in claim 13, wherein the run length coding is carried out so that each run of the identification values becomes long and thereby a code amount of the identification values is controlled.

16. A recording medium which stores a control program and which is readable by a computer, the control program comprising the steps of:

coding a sequence of input data signals into a plurality of code sequences obtained by the use of different coding methods given identification values, respectively;

selecting a shortest one of the code sequences together with a selected sequence of the identification values concerned with each code of the shortest code sequence;

coding the selected identification value sequence into a sequence of identification codes;

changing the selected identification value sequence into a changed sequence of identification values; and

re-coding the input data signals by the use of the changed sequence of the identification values to obtain re-coded codes of the input data signals and the corresponding changed identification codes and to produce the re-coded codes and the corresponding changed identification codes as a data compressed output signal sequence.

17. A recording medium as claimed in claim 16, wherein the changing step is executed so that a code amount of identification codes obtained by the changed sequence of the identification values becomes small in comparison with a code amount of the selected identification value sequence.

18. A recording medium as claimed in claim 16, wherein the re-coding step comprises the steps of:

calculating a first total code amount of the re-coded codes and the corresponding changed identification codes and a second total code amount of the shortest codes and the corresponding identification codes; and

comparing the first total code amount with the second total code amount to produce the re-coded codes and the changed identification codes as the compressed output data sequence when the first total code amount is smaller than the second total code amount.

19. A recording medium as claimed in claim 18, wherein the re-coding step comprises the step of:

further changing the sequence of the identification values so that the changed identification codes have a smaller amount to repeatedly operate the comparing means.

20. A recording medium as claimed in claim 18, wherein run length coding is carried out to calculate each code amount of the changed identification codes so that each run of the identification values becomes long.

21. A recording medium as claimed in claim 18, wherein the identification values are changed to changed identification values so that each run of the identification values becomes long and the re-coding step is carried out by the use of the changed identification values.

22. A data compression device operable in response to a sequence of input data signals to produce a sequence of output compressed data signals, the data compression device comprising:  
a plurality of data coding means which are given identification values, respectively, and which carry out coding of the input data signals in different ways, respectively, for coding the input data signal sequence into a plurality of codes with the respective identification values attached, respectively;

selecting means for selecting a minimum code amount of the codes as selected codes with selected identification values which are attached and which are coded into selected identification codes;

changing means for changing the identification values into changed identification values which are coded into changed identification codes;

re-coding means for re-coding the input data signals into a sequence of re-coded signals with reference to the changed identification values so as to compare a total code amount of the selected codes and the selected identification codes with a total code amount the re-coded codes and the changed identification codes;

the selected identification codes being produced by run length coding a sequence of the identification values while the changing means changes the identification values into the changed identification values by lengthening each run of the identification value sequence so that each run becomes long;

the re-coding means re-coding the input data signals in accordance with the changed identification codes.

23. A data compression device as claimed in claim 22, wherein each of the selected and the changed identification values is divided into a plurality of runs arranged from a leftmost run to a rightmost one;

the changing means successively lengthening each run from the leftmost run to the rightmost run.

24. A data compression method of executing data compression in response to a sequence of input data signals to produce a sequence of output compressed data signals, the data compression method comprising the steps of:

carrying out coding of the input data signals into a plurality of codes with respective identification codes attached by using a plurality of data coding means which are given the identification values, respectively;

selecting a minimum code amount of the codes as selected codes with selected identification values which are attached and which are coded into selected identification codes;

changing the identification values into changed identification values which are coded into changed identification codes;

re-coding the input data signals into a sequence of re-coded signals with reference to the changed identification values so as to compare a total code amount of the selected codes and the selected identification codes with a total code amount the re-coded codes and

the changed identification codes;

the selected identification codes being produced by run length coding a sequence of the identification values while the changing means changes the identification values into the changed identification values by lengthening each run of the identification value sequence so that each run becomes long;

the re-coding step re-coding the input data signals in accordance with the changed identification codes.

25. A data compression method as claimed in claim 24, wherein each of the selected and the changed identification values is divided into a plurality of runs arranged from a leftmost run to a rightmost one;

the changing means successively lengthening each run from the leftmost run to the rightmost run.

26. A program for use in carrying out data compression of a sequence of input data signals to produce a compressed output data sequence, the program comprising the steps of:

carrying out coding of the input data signals into a plurality of codes with respective identification codes attached by using a plurality of different data coding means which are given the identification values, respectively;

selecting a minimum code amount of the codes as selected codes with selected identification values which are attached and which are coded into selected identification codes;

changing the identification values into changed identification values which are coded into changed identification codes;

re-coding the input data signals into a sequence of re-coded signals with reference to the changed identification values so as to compare a total code amount of the selected codes and the selected



identification codes with a total code amount the re-coded codes and the changed identification codes;

the selected identification codes being produced by run length coding a sequence of the identification values while the changing means changes the identification values into the changed identification values by lengthening each run of the identification value sequence so that each run becomes long;

the re-coding step re-coding the input data signals in accordance with the changed identification codes.

27. A program as claimed in claim 26, wherein each of the selected and the changed identification values is divided into a plurality of runs arranged from a leftmost run to a rightmost one;

the changing means successively lengthening each run from the leftmost run to the rightmost run.

28. A program as claimed in claim 26, wherein the plurality of the different data coding means are Huffman coders which have coding tables different from one another.